Cromemco
RDOS
Instruction Manual

Five Dollars

Cromemco

RDOS

Cromemco
incorporated
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Introduction

The Cromemco Resident Disk Operating System (RDOS) is a 1K-byte program supplied in ROM with each Cromemco model 4FDC disk controller card. The RDOS program is designed to execute beginning at location C000 in memory space.

RDOS includes a bootstrap loader for the Cromemco Disk Operating System (CDOS) supplied with Cromemco disk software. RDOS also includes a system monitor with over a dozen commands. Several of the RDOS monitor commands are the same as those used in the Cromemco Z-80 Monitor program. These include commands to transfer program control, display the contents of memory, change the contents of memory, move and compare blocks of memory, write data to output ports, and change the baud rate of the serial port on the 4FDC card. The RDOS monitor also has several unique commands designed specifically for disk operations. These include commands to select one of four disk drives, set the head seek rate, seek disk tracks, read blocks of data from the disk, and write blocks of data onto the disk.

To use RDOS, first be sure that the power-on jump address of your ZPU card is set to memory location C000 (see Table 1). If you wish to boot in CDOS from your disk without entering the RDOS monitor, then set Switch 3 of the 4FDC card to the ON position (this selects auto-boot mode). Once CDOS is booted in, you may return to the RDOS monitor by executing the "BYE" command in CDOS. If on power-up or reset you do wish to enter the RDOS monitor, then set Switch 3 of the 4FDC card to the OFF position (see Table 2). Once the RDOS monitor is entered, you can begin using the RDOS commands described in this manual.

ZPU Switch	Switch Position
A15	1
A14	1
A13	0
A12	0

Table 1

The power-on jump address switch on the ZPU card should be set as shown to begin automatic execution of RDOS at location C000 in memory space.

RDOS Mode	4FDC Switch 3
CDOS Bootstrap	ON
RDOS Monitor	OFF

Table 2

The setting of Switch 3 on the 4FDC card sets the RDOS mode of operation on power up. When this switch is ON, CDOS is automatically booted in from the system diskette. When this switch is OFF, the RDOS Monitor is entered.

Command Format

The normal prompt of the monitor is a semi-colon, ';'. However, if a disk drive is selected the prompt changes in order to remind the user which drive is current. (See Select Disk Drive for details.)

The monitor is controlled by one and two-character commands from the terminal keyboard. The format is free-form with respect to spaces. All data is entered and printed in hexadecimal format.

In the following, DM is the Display Memory command and S is the Swath operator (see below). The four examples are equivalent commands. They display the contents of 100 hex bytes of memory beginning with location 1000 hex. ('(CR)' indicates carriage return).

```
;DM1000  10FF   (CR)
;DM1000S100     (CR)
; D M  1000  10FF   (CR)
; D M  1000  S 100  (CR)
```

When entering an address as an operand, only the last four digits typed in are retained. For example, '321000' is read as '1000'. Therefore, if a wrong digit is entered, continue typing until the last four digits are correct.

Only the last two digits typed are retained when a two-digit number such as a data byte is entered.

Swath Operator

There are two ways to specify the address range of many commands. The first is to simply list the beginning and ending addresses (and, where appropriate, the destination address). For example, the first command displays the contents of memory between addresses E400 and E402. The second command moves (or copies) the first 1400 hex bytes of memory to memory starting at 2000 hex.

```
DM E400  E402
M  0  13FF  2000
```

Another way to do the same thing is to use the Swath operator, S, to specify the width of the address range rather than state the ending address explicitly.

```
DM E400S3
M  0  S1400  2000
```

Errors and Escapes

When the monitor detects an error condition, the command is aborted and a '?' is printed followed by the prompt ';' for the next command.

Any command may be aborted from the keyboard either when the monitor is requesting further input, or during print-out, by depressing either of the ESCAPE or the ALT MODE key. (CONTROL-SEMI-COLON, CONTROL-SHIFT-'K', and ' } ' may also work, depending on the design of your CRT terminal.)

Baud Rate Selection

When the monitor is entered, push carriage-return (up to four times) until the monitor responds with:

```
CROMEMCO  RDOS
```

The monitor is capable of selecting 19200, 9600, 4800, 2400, 1200, 300, 150, or 110 baud. The maximum number of carriage-returns required to select any of these baud rates is four.

The baud rate can also be changed by using Initialize command. (See page 3 .)

Some peripheral devices such as paper tape readers or punches may have no keyboards. The baud rate can also be set by outputting a data byte from the following table to port 0.

Baud Rates	Data Byte
110	01
150	82
300	84
1200	88
2400	90
4800	A0
9600	C0

The baud rate can be octupled by outputting 10 hex to port 2. Outputting 0 to this port brings the baud rate back to normal.

System Stack

The RDOS stack normally resides in low memory between 40 and 80 hex. However, if it is in the way, it can be moved using the Kick Stack command. (See page 3.)

Using the RDOS Monitor

Set the power-on jump switch on the ZPU card to C (1100 binary) and turn off DIP switch 3 on the 4FDC.

Depress carriage-return two to four times in order to set the UART on the 4FDC to the baud rate of the terminal being used.

The monitor will then respond:

```
CROMEMCO  RDOS
```

followed by a prompt ';'. The monitor is then ready to accept commands from the keyboard.

Commands

Boot

(1) B (CR)

Boots CDOS from the diskette on drive-A. CDOS will then respond with its prompt 'A.'.

Display Memory

(2a) DM beginning-addr ending-addr (CR)
or
(2b) DM beginning-addr S swath-width

The contents of memory are displayed in hexadecimal form. Each line of the display is preceded by the address of its first byte. For example:

```
;DM100 S3
0100: C3 34 7F
```

Examine Input Port

(3) E port-number (CR)

Displays the current contents of the input port identified by port-number (in hex).

Go

(4) G starting-addr (CR)

Execution begins at starting-address.

Initialize Baud Rate

(5) I (CR)

After the carriage-return is typed, change the baud rate of the terminal to the desired value and then push carriage-return until the monitor responds with its prompt.

The monitor is capable of selecting 19200, 9600, 4800, 2400, 1200, 300, 150, or 110 baud. The maximum number of carriage returns required to select any of these baud rates is four.

Kick Stack

(6) K new-stack-location (CR)

Moves the monitor's stack from normal location at 7C hex to any convenient location in RAM memory. Remember to leave 64 (40 hex) bytes for the system stack above its new location (including 4 bytes for temporary storage above the stack proper).

Move

(7a) M source-addr source-end destination-addr (CR)
or
(7b) M source-addr Sswath-width destination-addr(CR)

Move (or copy) the contents of memory beginning with source-address and ending with source-end to destination-address. After the move, the monitor verifies that source and destination are the same. This will result in a print-out of discrepancies which are not really errors after certain types of overlapping moves. However, this print-out can be terminated by depressing ESCAPE or ALT Mode.

The move command can be used to fill a block of memory with a constant. For example, to enter zeros between locations 100 and 108, use the Substitute Memory command to enter 0 at location 100, and then move 100 through 107 to 101:

```
M 100  107  101
or
M 100 S   8  101
```

Care should be taken not to overwrite the monitor's stack which resides in low memory between 40 and 80 hex unless changed with the Kick Stack command.

Output

(8) O data-byte port-number (CR)

Writes data to the output port identified by port-number (in hex).

Read Disk

(9a) RD destination-addr destination-end sector-number (CR)
or
(9b) RD destination-addr S swath-width sector-number (CR)

Before this command will be accepted the disk drive and track number must have been specified. (See the Select Disk Drive and Seek commands.)

This command reads enough sectors from the current drive to fill the specified memory area, starting with the specified sector of the current track. The first track and sector and the last track and sector read are then displayed. However, if the last sector of the last track on the diskette is read before the memory area is filled then a question mark is printed and the command is terminated. The track and sector designations for both 5" and 8" diskettes are shown in Table 3.

The command is also terminated if an error occurs in reading a sector. In this case, a message of the following type is printed:

```
R-ERR nn
```

where nn is a hex number which indicates the status:

Bit	Indication
7	Not Ready
6	Record Type
5	Record Type
4	Record Not Found
3	CRC Error
2	Lost Data
1	Data Request
0	Busy

The number of the last track accessed can be obtained from input port 31 hex and the number of the last sector accessed from input port 32 hex. (See the Examine Input Port command.)

	8" Diskette	5" Diskette
Tracks	0-4C hex	0-27 hex
Sectors	1-1A hex	1-12 hex

Table 3

Care should be taken not to overwrite the monitor's stack which normally resides in lower RAM between 40 and 80 hex. If it is desired to load this region of memory from the disk, first move the stack using the Kick Stack command.

Seek Track

(10) S track-number (CR)

Before this command will be accepted the disk drive must be specified. (See the Select Disk Drive command.)

This command seeks the specified track of the current drive.

If an error is made, a message of the following type is printed:

```
S-ERR nn
```

where nn is a hex number which indicates the status:

Bit	Indication
7	Not Ready
6	Write Protect
5	Head Engaged
4	Seek Error
3	CRC Error
2	Track 0
1	Index
0	Busy

Substitute Memory

(11) SM address (CR)

Substitute Memory displays the contents of address and outputs a dot, '.', as a prompt for the substituted value. If no change is desired, type a space or another dot. Otherwise, enter the new value. The monitor accepts hex digits until it gets a delimiter, such as a space, dot, or carriage-return, retaining the last two digits entered as the value. Unless the delimiter is a carriage-return, the monitor then outputs the contents of the next sequential memory location with a dot prompt. A carriage-return terminates the command.

Verify

(12a) V source-addr source-end destination-addr (CR)
or
(12b) Vsource-addr S swath-width destination-addr (CR)

This command verifies that the block of memory between source-address and source-end contains the same values as the block beginning at destination-address. The addresses and contents are printed for each discrepancy found (unless the print-out is terminated by ESCAPE or ALT MODE).

This command works by reading bytes from the source and destination and comparing them. If a discrepancy is found, the memory is read again for print-out. Thus it can happen that a discrepancy is printed-out with the source and destination contents indicated to be the same. This is caused by a defective memory element.

Write Disk

(13a) WD source-addr source-end sector-number (CR)
or
(13b) WD source S swath-width sector-number (CR)

Before this command will be accepted the disk drive and track number must have been specified. (See the Select Disk Drive and Seek commands).

This command writes the contents of the specified memory area to the current drive, starting with the specified sector of the current track. The first track and sector and the last track and sector written are then displayed (see Table 3). However, if part of the memory area remains after the last sector of the last track is written, a question mark is printed and the command is terminated.

The command is also terminated if an error is made in writing a sector. In this case, a message of the following type is made:

```
W-ERR nn
```

where nn is a hex number indicating the status:

Bit	Indication
7	Not Ready
6	Write Protect
5	Write Fault
4	Record Not Found
3	CRC Error
2	Lost Data
1	Data Request
0	Busy

The last track accessed can be obtained from port 31 hex. The last sector accessed from port 32 hex. (See Examine Input command.)

Select Disk Drive

The 4FDC will control up to four disk drives, labelled "A", "B", "C", and "D". It can handle seek speeds from the slow seek appropriate to the mini floppy to the fast seek of Cromemco's large floppy. It can also handle the medium seek of some other large floppies. To select a drive and a seek speed, type the drive label followed by one semi-colon for the fast seek, and two semi-colons for medium seek, or three semi-colons for slow seek. For example, to select drive C with slow seek, type:

```
C ; ; ; (CR)
```

To select drive A with fast seek, type:

```
A ; (CR)
```

Until the drive selection is changed the normal monitor prompt, ';', will be replaced by the disk label and speed indicator as typed, 'C ; ; ;' in the first example.

All disk commands (Seek, Read Disk, and Write Disk) refer to the drive most recently selected.

Disk selection also restores the disk drive head to home, track 0. If an error is made in doing this a message of the following type is printed:

```
H-ERR nn
```

where nn is a hex number indicating the status:

Bit	Indication
7	Not Ready
6	Write Protect
5	Head Engaged
4	Seek Error
3	CRC Error
2	Track 0
1	Index
0	Busy

An Illustrative Example

To illustrate a specific use of the RDOS commands, consider the situation where you wish to make a copy of a diskette. If you have two disk drives this can easily be done using the CDOS command XFER. But if you have only one disk drive, you can use RDOS to read the original diskette into memory, and then write from memory to the new diskette. Since the total amount of system RAM memory is typically less than the capacity of a diskette, the procedure will have to be repeated several times — a different portion of the diskette is copied with each iteration.

The following procedure explains how to use RDOS to make a back-up mini-diskette using only one drive. This procedure assumes that there is 32K of contiguous low memory; if the user has less memory, the procedure can easily be adapted to a smaller configuration by decreasing the swath lengths of the READS and WRITES. Note that you must also keep track of the sector numbers when changing the following procedure. This is easily done by noting the starting and stopping track and sector numbers given after the completion of a READ or WRITE.

Throughout the following, note that the commands which are typed by the user are underlined. The other prompts and messages are those issued by RDOS. The messages enclosed in brackets are parenthetical remarks and should not be typed into the terminal.

Get into RDOS and insert the disk to be copied, or the original disk, into the drive. Then type the following RDOS commands.

```
;A;;;
A;;;S0
A;;;RD100 S7E00 1
 0001 0D12

[INSERT BLANK DISK WHICH HAS BEEN INITIALIZED AND
WHICH WILL BE THE NEW BACK-UP DISK.]

A;;;S0
A;;;WD100 S7E00 1
 0001 0D12

[INSERT ORIGINAL DISK.]

A;;;SE
A;;;RD100 S7E00 1
 0E01 1B12

[INSERT BACK-UP DISK.]

A;;;SE
A;;;WD100 S7E00 1
 0E01 1B12

[INSERT ORIGINAL DISK.]

A;;;S1C
A;;;RD100 S6C00 1
 1C01 2712

[INSERT BACK-UP DISK.]

A;;;S1C
A;;;WD100 S6C00 1
 1C01 2712
A;;;S0                 [HOME THE HEAD.]
A;;;B                  [SYSTEM SHOULD BOOT UP INTO CDOS FROM THE
                       NEW BACK-UP DISK.  TYPE THE DIRECTORY AND
                       VERIFY THAT THE TRANSFER IS CORRECT AND
                       COMPLETE BY TRYING SEVERAL OF THE FILES.]
```

RDOS Program Listing

```
                    0002 ; COPYRIGHT (C) 1977, CROMEMCO, INC.
                    0003 ;
                    0004 ;
0000                0005            ORG     0C000H  ;START OF PROM
                    0006 ;
                    0007 ;
         (007C)     0008 STACK:   EQU      7CH      ;MUST LEAVE ROOM FOR
                    0009 ;                          ;4 BYTES OF TEMP STORAGE
                    0010 ;                          ;ABOVE THE STACK
                    0011 ;                          ;(STACK)    = DISK FLAGS
                    0012 ;                          ;(STACK+1) = DISK LETTER (A - D)
                    0013 ;                          ;(STACK+2) - (STACK+3): ROOM FOR
                    0014 ;                          ;UP TO 2 SEMI-COLONS AS PART OF
                    0015 ;                          ;THE DISK PROMPT.
                    0016 ;
                    0017 ;
         (0004)     0018 NDRIVES:  EQU    4         ;MAX. NO. OF DISK DRIVES
                    0019 ;
                    0020 ; BIT ASSIGNMENT FOR THE DISK FLAGS
                    0021 ;
         (0007)     0022 FASTSEEK: EQU    7
         (0005)     0023 DISKMODE: EQU    5
         (0004)     0024 MAXI:     EQU    4
                    0025 ;THE DISK NUMBER (0 - 3) OCCUPIES BITS 0 & 1
                    0026 ;
                    0027 ;
         (0030)     0028 DSTAT:   EQU      30H      ;DISK STATUS PORT
         (0030)     0029 DCOMMND:EQU      30H      ;DISK COMMAND PORT
         (0032)     0030 DSEC:    EQU      32H      ;DISK SECTOR PORT
         (0033)     0031 DDATA:   EQU      33H      ;DISK DATA PORT
         (0034)     0032 DFLAGS:  EQU      34H      ;DISK FLAGS PORT
         (0034)     0033 DCONTR:  EQU      34H      ;DISK CONTROL PORT
         (0031)     0034 DTRACK:  EQU      31H      ;DISK TRACK PORT
                    0035 ;
         (0003)     0036 IMASK:   EQU      3        ;INTERRUPT MASK PORT
         (0000)     0037 BAUD:    EQU      0        ;BAUD RATE PORT
         (0004)     0038 PARLEL:  EQU      4        ;PARALLEL PORT
         (0040)     0039 BOOTSW:  EQU      40H      ;BOOT SWITCH
         (0010)     0040 MAXIM:   EQU      10H      ;MASK FOR MAXI DISK
         (0020)     0041 HDLDM:   EQU      20H      ;HEAD LOAD MASK
                    0042 ;
                    0043 ;
         (0000)     0044 STAT:    EQU      0        ;STATUS PORT
         (0001)     0045 DATA:    EQU      1        ;DATA PORT
         (0002)     0046 COMMND:  EQU      2        ;COMMAND PORT
         (0040)     0047 DAV:     EQU      40H      ;DATA-AVAILABLE MASK
         (0080)     0048 TBE:     EQU      80H      ;XMITTER-BUF-EMPTY MSK
                    0049 ;
         (0000)     0050 CASE:    EQU      0
                    0051 ;
         (000D)     0052 CR:      EQU      0DH
         (000A)     0053 LF:      EQU      0AH
         (001B)     0054 ESC:     EQU      1BH
         (007D)     0055 ALT:     EQU      7DH
                    0056 ;
```

```
                        0057 ;
                        0058 ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        0059 ;
C000 21[illegible]      0060 START:  LD      HL,STACK
C003 F9                 0061         LD      SP,HL
C004 EB                 0062         EX      DE,HL           ;DE --> TEMP STORAGE
C005 F3                 0063         DI
C006 CD[illegible]C0    0064         CALL    INITBAUD        ;INIT. THE SERIAL PORT
C009 97                 0065         SUB     A
C00A D3[illegible]      0066         OUT     IMASK,A         ;MASK OUT 4FDC INTERRUPTS
C00C DB34               0067         IN      A,DFLAGS        ;READ DISK FLAGS
C00E E610               0068         AND     BOOTSW          ;LOOK AT BOOT SWITCH
C010 2806               0069         JR      Z,BOOTDK
C012 C3[illegible]      0070         JP      MONITR
                        0071 ;
                        0072 ;
                        0073 ; MONITOR COMMAND
                        0074 ; QUIT THE MONITOR & BOOT CDOS IN.
                        0075 ;
C01[illegible]          0076 BOOTMC:
C01[illegible] CD[illegible]  0077    CALL    SKSGCR          ;REQUIRE A CR
                        0078 ;
                        0079 ;
                        0080 ; BOOT DISK
                        0081 ;
C01[illegible]          0082 BOOTDK:
C0[illegible] 3ED0      0083         LD      A,0D0H          ;TERMINATE THE HOMING
C01A D330               0084         OUT     DCOMMND,A       ;OF THE DISK HEAD
C01C DB30               0085 BOT200: IN      A,DSTAT
C01E 1F                 0086         RRA
C01F 38FB               0087         JR      C,BOT200
C021 F3                 0088         DI
C022 3E10               0089         LD      A,1 SHL MAXI    ;MAXI FLAG
C024                    0090 BOT300:
C024 218000             0091         LD      HL,0080H        ;INIT. BUFFER PNTR
C027 F9                 0092         LD      SP,HL           ;& STACK PNTR
C028 F5                 0093         PUSH    AF              ;SAVE MINI/MAXI FLAG
C029 44                 0094         LD      B,H             ;0 [DISK A]
C02A CD3FC0             0095         CALL    DHOME           ;HOME DISK
C02D 200B               0096         JR      NZ,BOT500       ;DISK ERROR
C02F F1                 0097         POP     AF              ;GET MINI/MAXI FLAG
C030 F5                 0098         PUSH    AF
C031 44                 0099         LD      B,H             ;0 [DISK A]
C032 1E01               0100         LD      E,1             ;SECTOR 1
C034 CD[illegible]C0    0101         CALL    DREAD           ;READ THE SECTOR
C037 CA8000             0102         JP      Z,80H           ;OK, GO EXECUTE
C03A F1                 0103 BOT500: POP     AF              ;GET MINI/MAXI FLAG
C03B EE10               0104         XOR     1 SHL MAXI      ;TOGGLE IT
C03D 18E5               0105         JR      BOT300
                        0106 ;
                        0107 ;
                        0108 ;HOME DISK DRIVE
                        0109 ;
                        0110 ;INPUT - B CONTAINS DISK NUMBER (0,1,2,3)
                        0111 ;          A BIT 4 CONTAINS 1 IF MAXI
                        0112 ;
                        0113 ;OUTPUT -- B CONTAINS STATUS
                        0114 ;           ZERO FLAG RESET IF ERROR
                        0115 ;
                        0116 ;REGISTERS A,F,B,C ARE CHANGED
                        0117 ;
                        0118 ;
```

```
C03F CDCBC0         0119 DHOME:  CALL     SELECT          ;SELECT DISK
C042 D334           0120         OUT      DCONTR,A        ;OUTPUT SELECT DATA
C044 1698           0121         LD       D,98H           ;ERROR MASK
C046 E610           0122         AND      MAXIM           ;MAXI DISK?
C048 3E7F           0123         LD       A,7FH           ;TURN OFF HIGH SPEED S[illegible]
C04A D304           0124         OUT      PARLEL,A
C04C 3E0F           0125         LD       A,0FH           ;LOAD MINI RESTORE COMMAND
C04E 281A           0126         JR       Z,EXECUTE       ;NO, ITS A MINI
C050 3E0D           0127         LD       A,0DH           ;MAXI RESTORE COMMAND
C052 1816           0128         JR       EXECUTE         ;EXEC COMMAND &
                    0129 ;                                ;WAIT TIL DONE
                    0130 ;
                    0131 ;
                    0132 ;SEEK TO DESIRED TRACK
                    0133 ;
                    0134 ;TRACK REGISTER MUST HAVE BEEN PREVIOUSLY LOADED
                    0135 ;(MAY BE DONE BY INITIALLY DOING A HOME)
                    0136 ;
                    0137 ;INPUT - B CONTAINS DISK DRIVE (0,1,2,3)
                    0138 ;        D CONTAINS TRACK
                    0139 ;        A BIT 7 = 1 FOR FAST SEEK
                    0140 ;        A BIT 4 = 1 FOR MAXI
                    0141 ;
                    0142 ;OUTPUT - B CONTAINS STATUS
                    0143 ;         ZERO FLAG RESET IF ERROR
                    0144 ;
                    0145 ;REGISTERS A,F,B,C,D ARE CHANGED
                    0146 ;
C054 F5             0147 DSEEK:  PUSH     AF              ;[illegible]
C055 CDCBC0         0148         CALL     SELECT          ;[illegible]
C058 D334           0149         OUT      DCONTR,A        ;[illegible]
C05A ED51           0150         OUT      (C),D           ;[illegible]
C05C 1698           0151         LD       D,98H           ;ERROR MASK
C05E F1             0152         POP      AF              ;GET FLAGS
C05F 17             0153         RLA                      ;FAST SEEK?
C060 3814           0154         JR       C,DSK500
C062 E620           0155         AND      MAXIM SHL 1     ;MASK FOR MINI/MAXI
C064 3E1F           0156         LD       A,01FH          ;LOAD SEEK COMMAND FOR MINI
C066 2802           0157         JR       Z,EXECUTE       ;MINI DISK
C068 3E1D           0158         LD       A,1DH           ;LOAD COMMAND FOR MAXI
                    0159 ;
                    0160 ;
C06A                0161 EXECUTE:
C06A D330           0162         OUT      DCOMMND,A       ;OUTPUT COMMAND
                    0163 ;
C06C                0164 EXCCHK:
C06C DB34           0165         IN       A,DFLAGS        ;WAIT FOR COMPLETION
C06E 1F             0166         RRA
C06F 30FB           0167         JR       NC,EXCCHK       ;(UNTIL INTREQ)
C071                0168 EREXIT:
C071 DB30           0169         IN       A,DSTAT         ;DISK STATUS
C073 47             0170         LD       B,A             ;SAVE STATUS
C074 A2             0171         AND      D               ;MASK FOR ERRORS
C075 C9             0172         RET
                    0173 ;
                    0174 ;
C076 3E6F           0175 DSK500: LD       A,6FH           ;TURN ON FAST SEEK
C078 D304           0176         OUT      PARLEL,A
C07A 3E18           0177         LD       A,18H           ;SEEK COMMAND
C07C CD6AC0         0178         CALL     EXECUTE
C07F DB04           0179 DSK540: IN       A,PARLEL        ;FAST SEEK DONE?
C081 E640           0180         AND      40H
```

```
C083 20FA               JR      NZ,DSK540
C085 3E7F               LD      A,7FH           ;TURN OFF FAST SEEK
C087 D304               OUT     PARLEL,A
C089 97                 SUB     A               ;NO ERROR CHECKING, SAY OK
C08A 47                 LD      B,A
C08B C9                 RET
                  ;
                  ;
                  ;READ 1 SECTOR FROM DISK
                  ;
                  ;INPUT - B CONTAINS DISK (0,1,2,3)
                  ;        E CONTAINS SECTOR
                  ;        A BIT 4 = 1 FOR MAXI
                  ;        HL CONTAINS BUFFER ADDRESS
                  ;
                  ;OUTPUT - B CONTAINS STATUS
                  ;         Z FLAG IS SET IF NO ERRORS
                  ;         HL PTS PAST BUFFER
                  ;
                  ;REGISTERS A,F,B,C,D,E,H,L ARE CHANGED
                  ;
                  ;
C08C CDB6C0       DREAD:  CALL    SETUP         ;SET UP FOR READ
C08F C688                 ADD     88H           ;ADD READ COMMAND TO
C091                                            ;HEAD LOAD FLAG
C091 169C                 LD      D,9CH         ;ERROR MASK
                  ;
C093 D330                 OUT     DCOMMND,A     ;OUTPUT READ COMMAND
C095 DB34         DRD250: IN      A,DFLAGS      ;WAIT FOR REQUEST
C097 1F                   RRA                   ;CHECK FOR INTREQ
C098 38D[illegible]               JR      C,EEXIT       ;END OF SECTOR OR ERROR
C09A EDA2                 INI                   ;READ A BYTE
C09C C295C0               JP      NZ,DRD250     ;NOT DONE YET
C09F 18[illegible]                 JR      EXCCHK        ;WAIT FOR INTREQ
                  ;
                  ;
                  ;WRITE A SECTOR TO THE DISK
                  ;
                  ;INPUT   B CONTAINS DISK (0,1,2,3)
                  ;        E CONTAINS SECTOR
                  ;        A BIT 4 = 1 FOR MAXI
                  ;        HL CONTAINS BUFFER ADDRESS
                  ;
                  ;OUTPUT   B CONTAINS STATUS
                  ;         Z FLAG IS SET IF NO ERRORS
                  ;         HL PTS PAST BUFFER
                  ;
                  ;REGISTERS A,F,B,C,D,E,H,L ARE CHANGED
                  ;
                  ;
C0A1 CDB6C0       DWRITE: CALL    SETUP         ;SET UP FOR WRITE
C0A4 C6A8                 ADD     0A8H          ;ADD WRITE COMMAND TO
C0A6                                            ;HEAD LOAD FLAG
C0A6 16FC                 LD      D,0FCH        ;ERROR MASK
C0A8 D330                 OUT     DCOMMND,A     ;OUTPUT WRITE COMMAND
C0AA DB34         DWR250: IN      A,DFLAGS      ;WAIT FOR REQUEST
C0AC 1F                   RRA                   ;CHECK FOR INTREQ
C0AD 38[illegible]                 JR      C,EEXIT       ;END OF SECTOR OR ERROR
C0AF EDA3                 OUTI                  ;READ A BYTE
C0B1 C2AAC0               JP      NZ,DWR250     ;NOT DONE YET
C0B4 18[illegible]                 JR      EXCCHK        ;WATT FOR INTREQ
                  ;
```

```
                    0243 ;
                    0244 ;SET UP FOR READ OR WRITE
                    0245 ;
                    0246 ;INPUT - B CONTAINS DISK DRIVE (0,1,2,3)
                    0247 ;         E CONTAINS SECTOR
                    0248 ;         A BIT 4 CONTAINS 1 IF MAXI
                    0249 ;
                    0250 ;OUTPUT - D CONTAINS SELECT BYTE
                    0251 ;          A CONTAINS HEAD LOAD FLAG
                    0252 ;          B CONTAINS 128 (# OF BYTES)
                    0253 ;          C CONTAINS DATA PORT
                    0254 ;
                    0255 ;REGISTERS A,F,B,C,D ARE CHANGED
                    0256 ;
                    0257 ;
C0B6                0258 SETUP:
C0B6 CDCBC0         0259         CALL    SELECT          ;GET SELECT BYTE
C0B9 F630           0260         OR      30H             ;TURN ON AUTO WAIT
C0BB 57             0261         LD      D,A             ;SAVE CONTROL BYTE
C0BC 7B             0262         LD      A,E             ;SECTOR #
C0BD D332           0263         OUT     DSEC,A
                    0264 ;
                    0265 ;CHECK WHETHER DISK HEAD LOADED
                    0266 ;
C0BF DB34           0267         IN      A,DFLAGS        ;READ FLAGS
C0C1 E620           0268         AND     HDLDM           ;HEAD LOADED?
C0C3 7A             0269         LD      A,D             ;CONTROL BYTE
C0C4 D334           0270         OUT     DCONTR,A        ;THIS MUST BE DONE AFTER
                    0271 ;                               ;THE [illegible] IT FROM DFLAGS
                    0272 ;                               ;BECAUSE OF AUTO WAIT
C0C6 3E04           0273         LD      A,4             ;HEAD NOT LOADED
C0C8 C8             0274         RET     Z
C0C9 97             0275         SUB     A               ;HEAD LOADED
C0CA C9             0276         RET
                    0277 ;
                    0278 ;
                    0279 ;SELECT DISK DRIVE
                    0280 ;
                    0281 ;INPUT - B CONTAINS DISK DRIVE (0,1,2,3)
                    0282 ;         A BIT 4 CONTAINS 1 IF MAXI
                    0283 ;
                    0284 ;OUTPUT - A CONTAINS SELECT BYTE
                    0285 ;          B CONTAINS 128
                    0286 ;          C CONTAINS DATA PORT #
                    0287 ;
                    0288 ;REGISTERS A,F,B,C ARE CHANGED
                    0289 ;
                    0290 ;
C0CB E610           0291 SELECT: AND     MAXIM           ;GET MAXI FLAG ONLY
C0CD 4F             0292         LD      C,A             ;SAVE FLAG
C0CE 04             0293         INC     B               ;CALCULATE DISK SELECT
C0CF 97             0294         SUB     A
C0D0 37             0295         SCF
C0D1 17             0296 SEL300: RLA
C0D2 10FD           0297         DJNZ    SEL300
C0D4 B1             0298         OR      C               ;MAXI FLAG
C0D5 F620           0299         OR      20H             ;MOTOR ON
C0D7 013380         0300         LD      BC,8000H+DDATA
C0DA C9             0301         RET
                    0302 ;
                    0303 ;
                    0304 ;
```

```
                ; CHECK INPUT & RETURN WITH DATA IF READY.
                ;
C0DB DB00       CHKIN:  IN      A,STAT
C0DD E640               AND     DAV
C0DF C8                 RET     Z
C0E0 DB01               IN      A,DATA
C0E2 C9                 RET
                ;
                ;
                ; GET CHARACTER FROM INPUT.
                ;
C0E3 CDDBC0     GBYTE:  CALL    CHKIN
C0E6 28FB               JR      Z,GBYTE
C0E8 E67F               AND     7FH
C0EA C9                 RET
                ;
                ;
                ; COMMAND
                ; CHANGE BAUD RATE OF THE SERIAL PORT
                ;
C0EB            INITBR:
C0EB CD29C2             CALL    SKSGCR          ;REQUIRE CR
                ;                               ;[CONTINUE BELOW]
                ;
                ;
                ; INITIALIZE BAUD RATE OF THE CURRENT DEVICE.
                ;
                ; PUSH CARRIAGE-RETURN TO SELECT THE PROPER BAUD
                ; RATE FOR THE CURRENT TERMINAL.  (THE MAXIMUM
                ; NUMBER OF CARRIAGE-RETURNS REQUIRED IS FOUR.)
                ;
                ; ANY OF THE FOLLOWING BAUD RATES CAN BE SELECTED:
                ; 19200, 9600, 4800, 2400, 1200, 300, 150, 110.
                ;
C0EE 21CAC3     INITBAUD: LD    HL,BAUDRS
C0F1 0E00               LD      C,BAUD
C0F3 3E19               LD      A,19H           ;OUTPUT THE CLOCK
C0F5 D302       IT1:    OUT     COMMND,A        ;& RESET CURRENT DEVICE
C0F7 EDA3               OUTI
C0F9 CDE3C0             CALL    GBYTE
C0FC CDE3C0             CALL    GBYTE
C0FF FE0D               CP      CR
C101 3E09               LD      A,9             ;SLOW THE CLOCK
C103 20F0               JR      NZ,IT1
C105 C9                 RET
                ;
                ;
                ; COMMAND
                ; CHANGE LOCATION OF THE SYSTEM STACK
                ;
C106            KICKSTK:
C106 CD85C2             CALL    L1NCR
C109 1813               JR      LOADIX          ;IX STORES INITIAL SP VALUE
                ;
                ;
                ;----------------------------------------------------------
                ; MONITOR ENTRY POINT
                ;----------------------------------------------------------
                ;
                ; ENTER MONITOR WITH THE STK PNTR LOADED & WITH
                ; DE -> THE DISK FLAGS.  [THIS IS ALSO
                ; THE TOP OF THE STACK.]
```

```
                    0367 ;
C10E                0368 MONITR:
C10E CDF7C2         0369           CALL    PMSGFOLLOWING
C111 0D0D4352       0370           DB      CR,CR,'CROMEMCO RDOS','1'+80H
     4F4D454D
     434F2052
     444F53B1
                    0371 ;
C11E                0372 LOADIX:
C11E 97             0373           SUB     A
C11F 12             0374           LD      (DE),A          ;CLEAR DISK MODE
C120 D5             0375           PUSH    DE
C121 DDE1           0376           POP     IX              ;IX STORES INITIAL SP VALUE
                    0377 ;
C123                0378 CLEANSTACK:
C123 DDF9           0379           LD      SP,IX           ;RE-INITIALIZE SP
                    0380 ;
                    0381 ;
                    0382 ; GET COMMAND.
                    0383 ; RETURNS VALUE IN HL & JUMPS TO THAT ADDR.
                    0384 ;
C125 CDA9C1         0385           CALL    CRLF
C128 2128C1         0386 CMND:     LD      HL,CMND         ;SET UP RETURN
C12B DDE5           0387           PUSH    IX
C12D E3             0388           EX      (SP),HL         ;RETN ADDR ON STK
C12E 4E             0389           LD      C,(HL)          ;HL -> DISK FLAGS
C12F CB[illegible]  0390           BIT     DISKMODE,C
C131 23             0391           INC     HL              ; -> DISK LETTER
C132 C4[illegible]C2 0392          CALL    NZ,PMSG         ;DISK MODE IF SET
C135 CDF7C2         0393           CALL    PMSGFOLLOWING
C138 BB             0394           DB      ';'+80H         ;THE REGULAR PROMPT
                    0395 ;
C139 CDFAC2         0396           CALL    SKSG0           ;GET THE COMMAND
C13C 2005           0397           JR      NZ,CM6
C13E DD360000       0398           LD      (IX),0          ;[illegible] NOT IN DISK MODE.
C142 C9             0399           RET
                    0400 ;
C143 D641           0401 CM6:      SUB     'A'+CASE        ; < 'A'?
C145 382E           0402           JR      C,ERROR
C147 FE17           0403           CP      'W'-'A'+1       ; > 'W'?
C149 302A           0404           JR      NC,ERROR
C14B 5F             0405           LD      E,A
C14C 1600           0406           LD      D,0
                    0407 ;
C14E CDFAC2         0408           CALL    SKSG0           ;NEXT COMMAND CHARACTER
C151 FE3B           0409           CP      ';'
C153 280D           0410           JR      Z,DISKSELECT
C155 EB             0411           EX      DE,HL
C156 29             0412           ADD     HL,HL           ;TIMES 2
C157 11[illegible]C3 0413          LD      DE,CMNDTBL
C15A 19             0414           ADD     HL,DE           ; + TBL ADDR
C15B 5E             0415           LD      E,(HL)
C15C 23             0416           INC     HL
C15D 56             0417           LD      D,(HL)
C15E EB             0418           EX      DE,HL
C15F FE4D           0419           CP      'M'+CASE        ;(USED IN SUBST & DISPL)
C161 E9             0420           JP      (HL)
                    0421 ;
                    0422 ;
                    0423 ; DISK SELECT
                    0424 ; ENTER WITH E CONTAINING THE DISK NUMBER
                    0425 ;
```

```
C162                0426 DISKSELECT:
C162 7B             0427          LD       A,E              ;DISK NUMBER
C163 FE04           0428          CP       NDRIVES          ;A THROUGH D ONLY
C165 303E           0429          JR       NC,ERROR
C167 43             0430          LD       B,E              ;SAVE DISK #
C168 DDE5           0431          PUSH     IX
C16A E1             0432          POP      HL               ; -> DISK FLAGS
C16B F6[illegible]  0433          OR       [1 SHL DISKMODE]![1 SHL MAXI]![1 SHL FASTSEEK]
C16D 77             0434          LD       (HL),A           ;DISK # & FLAGS
C16E 54             0435          LD       D,H
C16F 5D             0436          LD       E,L
C170 13             0437          INC      DE               ;     DISK LETTER
C171 78             0438          LD       A,B
C172 C641           0439          ADD      'A'
C174 12             0440          LD       (DE),A           ;DISK LETTER
C175 CD19C2         0441          CALL     GCHR
C178 FE3B           0442          CP       ';'
C17A 2010           0443          JR       NZ,DS2
C17C CBBE           0444          RES      FASTSEEK,(HL)    ;NOT FAST SEEK
C17E 13             0445          INC      DE
C17F 12             0446          LD       (DE),A           ;PART OF DISKMODE PROMPT
C180 CD19C2         0447          CALL     GCHR
C183 FE3B           0448          CP       ';'
C185 2005           0449          JR       NZ,DS2
C187 CBA6           0450          RES      MAXI,(HL)        ;MINI FLOPPY
C189 13             0451          INC      DE
C18A 12             0452          LD       (DE),A
C18B 97             0453          SUB      A
                    0454 ;
C18C CD29C2         0455 DS2:     CALL     SKSGCR           ;ALSO EXCGS DE & HL
C18F CBFE           0456          SET      7,(HL)           ;MARK END-OF-MSG
                    0457 ;
C191 1A             0458          LD       A,(DE)           ;DISK FLAGS
C192 CD3BC0         0459          CALL     DHOME
C195 3E48           0460          LD       A,'H'            ;IN CASE OF HOME ERROR
                    0461 ;
C197                0462 DERSEK:
C197 C8             0463          RET      Z                ;IF NO ERROR, DONE
                    0464 ;
C198                0465 PERRMSG:
C198 CDF7C1         0466          CALL     PMSGFOLLOWING
C19B 20455252       0467          DB       ' ERR',' '+80H
     A0
C1A0 CDF1C1         0468          CALL     PCHR             ;ERROR LETTER
C1A3 78             0469          LD       A,B              ;ERROR NUMBER
                    0470 ;
                    0471 ;
                    0472 ; PRINT THE 2 HEX DIGITS IN THE A REGISTER
                    0473 ; AND CLEAN STACK.
                    0474 ;
C1A4                0475 P2HXCLEAN:
C1A4 CDD4C2         0476          CALL     P2HEX
C1A7 1810           0477          JR       CLEANV
                    0478 ;
                    0479 ;
                    0480 ; PRINT CRLF
                    0481 ;
C1A9                0482 CRLF:
C1A9 3E0D           0483          LD       A,CR
C1AB 1844           0484          JR       PCHR
                    0485 ;
                    0486 ;
                    0487 ; COMMAND
                    0488 ; EXAMINE INPUT PORT
                    0489 ;
C1AD                0490 EXMINPUT:
C1AD CD85C2         0491           CALL    LINCR
C1B0 4F             0492           LD      C,E            ;PORT #
C1B1 ED78           0493           IN      A,(C)
C1B3 18E1           0494           JR      P2HXCLEAN      ;PRINT THE VALUE, CRLF
                    0495 ;
                    0496 ;
                    0497 ; ERROR & ESCAPE. RETURNS TO CMND WITH SP
                    0498 ; RE-INITIALIZED.
                    0499 ;
C1B5                0500 ERROR:
C1B5 CDF7C2         0501           CALL    PMSGFOLLOWING
C1B8 BF             0502           DB      '?'+80H
C1B9                0503 ESCAPE:
C1B9                0504 CLEANV:
C1B9 C323C1         0505           JP      CLEANSTACK
                    0506 ;
                    0507 ;
                    0508 ; GET NEXT SECTOR FOR THE READ & WRITE DISK
                    0509 ; ROUTINES.  PRESERVES HL AND [illegible] RETURNING,
                    0510 ; POPS DE AND BC FROM THE STACK.
                    0511 ;
C1BC                0512 NEXTSC:
C1BC D9             0513           EXX
C1BD E1             0514           POP     HL             ;[illegible]
C1BE D9             0515           EXX
C1BF D1             0516           POP     DE
C1C0 2805           0517           JR      Z,NS2          ;[illegible] ERROR
C1C2 15             0518           DEC     D              ;[illegible]
C1C3 28D3           0519           JR      Z,PERRMSG
C1C5 180A           0520           JR      NS4            ;YES. USE OLD MEM PNTR
                    0521 ;
C1C7 017FFF         0522 NS2:      LD      BC,-81H        ;NO [illegible]
C1CA FD09           0523           ADD     IY,BC          ;BUMP [illegible]
C1CC FD23           0524           INC     IY
C1CE E3             0525           EX      (SP),HL        ;[illegible]
C1CF 160A           0526           LD      D,10           ;[illegible]
                    0527 ;
C1D1 E1             0528 NS4:      POP     HL             ;MEM PNTR
C1D2 C1             0529           POP     BC
C1D3 79             0530           LD      A,C            ;RELOAD DISK FLAGS
C1D4 D9             0531           EXX
C1D5 E5             0532           PUSH    HL             ;RETURN ADDR
C1D6 D9             0533           EXX
C1D7 C0             0534           RET     NZ             ;IF ERROR, DONE
                    0535 ;
C1D8 D4A2C3         0536           CALL    NC,[illegible] ;IF NEGATIVE, DONE.
C1DB 30DC           0537           JR      NC,CLEANV      ;[illegible]
                    0538 ;
C1DD 1C             0539           INC     E              ;BUMP SECTOR #
C1DE CDA[illegible] 0540           CALL    CHKSECNO
C1E1 D0             0541           RET     NC             ;DONE IF # [illegible]
C1E2 DB[illegible]  0542           IN      A,(DTRACK)     ;[illegible] TRACK #
C1E4 3C             0543           INC     A              ;BUMP IT
C1E5 5F             0544           LD      E,A
C1E6 C5             0545           PUSH    BC
C1E7 CD[illegible]C3 0546          CALL    SEEKNXT        ;SEEK NEXT TRACK
C1EA C1             0547           POP     BC
C1EB 79             0548           LD      A,C            ;DISK FLAGS
```

```
C1EC 1E01          0549         LD      E,1               ;SECTOR 1
C1EE C9            0550         RET
                   0551 ;
                   0552 ;
                   0553 ; PRINT SPACE.  ALTERS A.
                   0554 ;
C1EF 3E20          0555 SPACE:  LD      A,' '             ;(CONTINUE BELOW)
                   0556 ;
                   0557 ;
                   0558 ; PRINT THE CHARACTER IN THE A-REGISTER.
                   0559 ; (CHKS INPUT FOR ESC.) PRESERVES ALL REGS.
                   0560 ;
C1F1 F5            0561 PCHR:   PUSH    AF                ;SAVE THE CHAR
C1F2 E67F          0562 PC1:    AND     7FH
C1F4 FE1B          0563         CP      ESC
C1F6 28C1          0564         JR      Z,ESCAPE
C1F8 FE7D          0565         CP      ALT               ;ALT MODE?
C1FA 28BD          0566         JR      Z,ESCAPE
C1FC CDDBC0        0567         CALL    CHKIN
C1FF 20F1          0568         JR      NZ,PC1
                   0569 ;
C201 DB00          0570 PC2:    IN      A,STAT
C203 E680          0571         AND     TBE
C205 28FA          0572         JR      Z,PC2
C207 F1            0573         POP     AF
C208 F5            0574         PUSH    AF
C209 E67F          0575         AND     7FH
C20B D301          0576         OUT     DATA,A
C20D FE0D          0577         CP      CR
C20F 2006          0578         JR      NZ,PC3
C211 CDF7C2        0579         CALL    PMSGFOLLOWING
C214 0A0080        0580         DB      LF,0,80H
C217 F1            0581 PC3:    POP     AF
C218 C9            0582         RET
                   0583 ;
                   0584 ;
                   0585 ; GET CHARACTER, RETURNS IT IN A.
                   0586 ; ALTERS F.
                   0587 ;
C219 CDE3C0        0588 GCHR:   CALL    GBYTE
C21C CDF1C1        0589         CALL    PCHR
C21F FE61          0590         CP      61H               ;CONVERT LOWER CASE
C221 D8            0591         RET     C                 ;TO UPPER.
C222 D620          0592         SUB     20H
C224 C9            0593         RET
                   0594 ;
                   0595 ;
                   0596 ; LOADS HL WITH SOURCE ADDR, BC & DE
                   0597 ; WITH THE INCREMENT.  ENDS WITH A CRLF.
                   0598 ;
C225 97            0599 L2NCR0: SUB     A
                   0600 ;
C226 CD64C2        0601 L2NCR:  CALL    LD2N
                   0602 ;
                   0603 ; SKIP INITIAL SPACES.
                   0604 ; IF DELIMITER NOT A CR, ERROR
                   0605 ;
C229 CDBBC2        0606 SKSGCR: CALL    SKSG              ;WAIT FOR NON-SPACE
C22C 2087          0607         JR      NZ,ERROR          ;IF NOT CR, ERROR
C22E EB            0608         EX      DE,HL
C22F C9            0609         RET
                   0610 ;
```

```
                        0611 ;
                        0612 ; PRINT THE NUMBER IN HL, FOLLOWED BY A COLON.
                        0613 ; PRESERVES ALL REGISTERS EXCEPT A.
                        0614 ;
C230 CDA9C1             0615 PCADDR: CALL     CRLF
                        0616 ;
C233 CDCFC2             0617 PADDR:  CALL     PNHL
C236 3E3A               0618         LD       A,':'
C238 1867               0619         JR       PCHR
                        0620 ;
                        0621 ;
                        0622 ; COMMAND
                        0623 ;
C23A CD82C2             0624 VERIF:  CALL     L3NCR          ;GET 3 OPERANDS
                        0625 ;
                        0626 ; COMPARES TWO AREAS OF MEMORY.  ENTER WITH
                        0627 ; SOURCE IN HL, DESITNATION IN DE & COUNT
                        0628 ; IN BC.   ALTERS ALL REGISTERS.
                        0629 ;
C23D                    0630 VRFY:
C23D 1A                 0631         LD       A,(DE)
C23E EDA1               0632         CPI                     ;COMPARE TO SOURCE
C240 2B                 0633         DEC      HL
C241 C4CFC2             0634         CALL     NZ,PNHL        ;PRINT SOURCE ADDR
C244 C4C6C2             0635         CALL     NZ,PSNM        ; & CONTENT
C247 EB                 0636         EX       DE,HL
C248 C4C6C2             0637         CALL     NZ,PSNM        ; & DEST CONTENTS
C24B C4CFC2             0638         CALL     NZ,PNHL        ; & DEST ADDR
C24E C4A9C1             0639         CALL     NZ,CRLF
C251 EB                 0640         EX       DE,HL
C252 23                 0641         INC      HL
C253 13                 0642         INC      DE
C254 E0                 0643         RET      PO             ; IF BC=0, DONE.
C255 18E6               0644         JR       VRFY
                        0645 ;
                        0646 ; COMMAND
                        0647 ;
C257                    0648 MOVE:
C257 CD82C2             0649         CALL     L3NCR          ;OPERANDS
C25A E5                 0650         PUSH     HL
C25B D5                 0651         PUSH     DE
C25C C5                 0652         PUSH     BC
C25D EDB0               0653         LDIR
C25F C1                 0654         POP      BC
C260 D1                 0655         POP      DE
C261 E1                 0656         POP      HL
C262 18D9               0657         JR       VRFY
                        0658 ;
                        0659 ;
                        0660 ;
                        0661 ; LOAD TWO NUMBERS. LOADS DE WITH THE BEGINNING
                        0662 ; ADDR, N1. LOADS BC & HL WITH THE INCREMENT
                        0663 ; N2-N1+1 (OR WITH N2 IF THE OPR IS 'S').
                        0664 ; RETURNS WITH LAST DELIMITER IN A.
                        0665 ;
                        0666 ;
C264 CD8FC2             0667 LD2N:   CALL     GNHL           ;N1 TO HL, DELIM TO A
C267 EB                 0668         EX       DE,HL          ;SAVE N1 IN DE
C268 CDEBC2             0669         CALL     SKSG           ;GET NEXT NON-SPACE
C26B FE53               0670         CP       'S'+CASE       ;WATH?
C26D 2005               0671         JR       NZ,L2N1
                        0672 ;
```

```
C26F CD8AC2     0673          CALL     GNHL0            ;YES. INCREMENT TO HL.
C272 1807       0674          JR       L2N2
                0675 ;
C274 CD8BC2     0676 L2N1:    CALL     GNHL             ;INCREMENT
C277 B7         0677          OR       A                ;CLEAR CY
C278 ED52       0678          SBC      HL,DE            ;N2-N1
C27A 23         0679          INC      HL               ;INCLUDE END POINT
C27B 44         0680 L2N2:    LD       B,H
C27C 4D         0681          LD       C,L              ;BC GETS THE INCRM
C27D E5         0682          PUSH     HL
C27E FDE1       0683          POP      IY               ;& SO DOES IY.
C280 C9         0684          RET
                0685 ;
                0686 ;
                0687 ; LOAD 3 OPERANDS. HL GETS THE SOURCE, BC
                0688 ; THE INCREMENT, AND DE THE 3RD OPERAND.
                0689 ;
C281 97         0690 L3NCR0: SUB      A
                0691 ;
C282 CD64C2     0692 L3NCR:   CALL     LD2N
                0693 ; (CONTINUE BELOW)
                0694 ;
                0695 ;
                0696 ; ENTER WITH SPACE OR THE FIRST DIGIT
                0697 ; OF A NUMBER IN A. LOADS HL WITH
                0698 ; WITH A NEW NUMBER & THEN EXCHANGES
                0699 ; DE & HL. FINISHES WITH A CRLF.
                0700 ;
C285 CD8BC2     0701 L1NCR:   CALL     GNHL             ;SKIP SPACES, LOAD HL
C288 189F       0702          JR       SKSGCR           ;WAIT FOR A CR
                0703 ;
                0704 ;
                0705 ; CLEARS HL. IF ENTERED WITH HEX CHAR IN A,
                0706 ; SHIFTS IT INTO HL. O/W, IGNORES LEADING
                0707 ; SPACES. FIRST CHAR MUST BE HEX. CONTINUES
                0708 ; SHIFT UNTIL A NON HEX CHAR RECEIVED & THEN
                0709 ; RETURNS WITH THE LATTER IN A.
                0710 ; PRESERVES B,C,D,E.
                0711 ;
                0712 ;
C28A 97         0713 GNHL0:   SUB      A
                0714 ;
C28B C5         0715 GNHL:    PUSH     BC               ;SAVE
C28C 210000     0716          LD       HL,0             ;CLEAR BUFFER
                0717 ; STRIP LEADING SPACES & GET CHAR
C28F CDBBC2     0718          CALL     SKSG
                0719 ; FIRST CHAR MUST BE HEX
C292 CDA3C2     0720          CALL     HEXSH            ;IF HEX, SHIFT INTO HL
C295 DAE5C1     0721          JP       C,ERROR          ;O/W, ERROR
C298 CD19C2     0722 GN1:     CALL     GCHR
C29B CDA3C2     0723          CALL     HEXSH            ;IF HEX SHIFT INTO HL
C29E 78         0724          LD       A,B              ;RESTORE CHAR
C29F 30F7       0725          JR       NC,GN1           ;IF HEX, CONTINUE
C2A1 C1         0726          POP      BC               ;IF NON-HEX, DONE
C2A2 C9         0727          RET
                0728 ;
                0729 ;
                0730 ; IF A CONTAINS HEX CHAR, SHIFTS BINARY EQUIVALENT
                0731 ; INTO HL. IF NOT HEX, RET WITH CY SET. SAVES
                0732 ; ORIGINAL CHAR IN B
                0733 ;
C2A3 47         0734 HEXSH:   LD       B,A
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```
C2A4 D630           0735          SUB      '0'              ; < '0'?
C2A6 D8             0736          RET      C
C2A7 C6E9           0737          ADD      '0'-['G'+CASE]
C2A9 D8             0738          RET      C
C2AA D6FA           0739          SUB      'A'-'G'
C2AC 3003           0740          JR       NC,HX1           ;OK IF >= 'A
C2AE C607           0741          ADD      ['A'+CASE]-['9'+1]
C2B0 D8             0742          RET      C
C2B1 C60A           0743 HX1:     ADD      '9'+1-'0'
                    0744 ; THE A REG NOW CONTAINS THE HEX DIGIT IN BINARY.
                    0745 ; (THE HIGH ORDER NIBBLE OF A IS 0.)
C2B3 29             0746 HXSH4:   ADD      HL,HL            ;SHIFT 4 BITS INTO HL
C2B4 29             0747          ADD      HL,HL
C2B5 29             0748          ADD      HL,HL
C2B6 29             0749          ADD      HL,HL
C2B7 B5             0750          OR       L
C2B8 6F             0751          LD       L,A
C2B9 C9             0752          RET
                    0753 ;
                    0754 ;
                    0755 ; RETURNS WITH A NON SPACE IN THE A-REG.
                    0756 ; IF ENTERED WITH A-REG CONTAINING A NULL
                    0757 ; OR A SPACE, GETS NEW CHARS UNTIL FIRST
                    0758 ; NON SPACE OCCURS. ALTERS AF.
                    0759 ;
C2BA 97             0760 SKSG0:   SUB      A
                    0761 ;
C2BB B7             0762 SKSG:    OR       A                ;DOES A CONTAIN NULL?
C2BC CC19C2         0763 SK1:     CALL     Z,GCHR
C2BF FE20           0764          CP       20H              ;SPACE ?
C2C1 28F9           0765          JR       Z,SK1
C2C3 FE0D           0766          CP       CR
C2C5 C9             0767          RET
                    0768 ;
                    0769 ;
                    0770 ;
                    0771 ; PRINT SPACE FOLLOWED BY THE NUMBER POINTED
                    0772 ; TO BY HL. ALTERS A ONLY.
                    0773 ;
C2C6 CDEFC1         0774 PSNM:    CALL     SPACE
                    0775 ; (CONTINUE BELOW)
                    0776 ;
                    0777 ; PRINTS THE NUMBER POINTED TO BY HL.
                    0778 ; PRESERVES ALL REGISTERS BUT A.
                    0779 ;
C2C9 7E             0780 PNM:     LD       A,(HL)
C2CA 1808           0781          JR       P2HEX
                    0782 ;
                    0783 ;
                    0784 ;
                    0785 ; PRINT THE NUMBER IN HL.
                    0786 ; PRESERVES ALL BUT A.
                    0787 ;
C2CC CDEFC1         0788 PSNHL:   CALL     SPACE
                    0789 ;
C2CF 7C             0790 PNHL:    LD       A,H
C2D0 CDD4C2         0791      (   CALL     P2HEX
C2D3 7D             0792          LD       A,L
                    0793 ;                                   ;(CONTINUE BELOW)
                    0794 ;
                    0795 ; PRINT THE NUMBER IN THE A REGISTER.
                    0796 ; PRESERVES ALL REGISTERS.
```

```
                      0797 ;
C2D4 CDD8C2           0798 P2HEX:   CALL     P1HEX
C2D7 1F               0799          RRA
C2D8 1F               0800 P1HEX:   RRA
C2D9 1F               0801          RRA
C2DA 1F               0802          RRA
C2DB 1F               0803          RRA
C2DC F5               0804          PUSH     AF
C2DD E60F             0805          AND      0FH              ;MASK
C2DF FE0A             0806          CP       10D              ; <= 9?
C2E1 3802             0807          JR       C,PH1
C2E3 C607             0808          ADD      7                ;A THRU F
C2E5 C630             0809 PH1:     ADD      30H              ;ASCII BIAS
C2E7 CDF1C1           0810          CALL     PCHR             ;PRINT IT
C2EA F1               0811          POP      AF
C2EB C9               0812          RET
                      0813 ;
                      0814 ;
                      0815 ; PRINT MESSAGE. ENTER WITH ADDR OF MSG
                      0816 ; IN HL.  THE MESSAGE IS TERMINATED
                      0817 ; AFTER PRINTING A CHARACTER WHOSE
                      0818 ; PARITY BIT WAS SET.
                      0819 ; PRESERVES FLAGS, INCREMENTS HL.
                      0820 ;
                      0821 ;
                      0822 ;
C2EC F5               0823 PMSG:    PUSH     AF               ;SAVE
C2ED 7E               0824 PS1:     LD       A,(HL)
C2EE 23               0825          INC      HL
C2EF CDF1C1           0826          CALL     PCHR
C2F2 17               0827          RLA                       ;LAST CHARACTER?
C2F3 30F8             0828          JR       NC,PS1           ;IF NOT, LOOP
C2F5 F1               0829          POP      AF
C2F6 C9               0830          RET
                      0831 ;
                      0832 ;
                      0833 ; PRINTS THE MESSAGE FOLLOWING THE CALL
                      0834 ; TO THIS ROUTINE.
                      0835 ; PRESERVES ALL REGISTERS
                      0836 ;
C2F7                  0837 PMSGFOLLOWING:
C2F7 E3               0838          EX       (SP),HL
C2F8 CDECC2           0839          CALL     PMSG
C2FB E3               0840          EX       (SP),HL
C2FC C9               0841          RET
                      0842 ;
                      0843 ;
                      0844 ; COMMAND
                      0845 ;
                      0846 ; GO <ADDR>
                      0847 ; EXECUTION BEGINS AT ADDR.
                      0848 ;
C2FD                  0849 GO:
C2FD E1               0850          POP      HL               ;CLEAN STACK
C2FE CD25C2           0851          CALL     L1NCR            ;GET ADDR
C301 EB               0852          EX       DE,HL
C302 E9               0853          JP       (HL)
                      0854 ;
                      0855 ;
                      0856 ; COMMAND.  DISPLAY MEMORY.
                      0857 ;
                      0858 ; DM <STARTING ADDR> <ENDING ADDR OR SWATH>
```

```
                    ;
C303                DSPM:
C303 2036                     JR      NZ,ERRORV         ;IF NOT 'M', ERROR
C305 CD25C2                   CALL    L2NCR0            ;GET OPERANDS
C308 1610           DSPM1:    LD      D,16              ;BYTE COUNT
C30A CD30C2                   CALL    PCADDR            ;ADDRESS
C30D CDC6C2         DM2:      CALL    PSNM              ;MEM CONTENTS
C310 EDA1                     CPI                       ;INC HL & DEC BC
C312 E2A9C1                   JP      PO,CRLF
C314 15                       DEC     D
C316 28F0                     JR      Z,DSPM1
C318 7A                       LD      A,D
C319 E603                     AND     3
C31B CCEFC1                   CALL    Z,SPACE
C31E 18ED                     JR      DM2
                    ;
                    ;
C320                SHANDLER:
C320 281C                     JR      Z,SUBSM           ;IF 'M', SUBSM
                    ;
                    ;
                    ; DISK SEEK
                    ;
C322                SEEKR:
C322 CB49                     BIT     DISKMODE,C
C324 2815                     JR      Z,ERRORV
C326 CD85C2                   CALL    L1NCR             ;E = TRACK #
C329                SEEKNXT:
C329 3E4C                     LD      A,76              ;MAX TRACK #, MAXI DISK
C32B 1627                     LD      D,39              ;MAX TRACK #, MINI DISK
C32D CDB2C0                   CALL    CHKNO             ;CHECK #
C330 3809                     JR      C,ERRORV
C332 53                       LD      D,E               ;TRACK #
C333 CD94C0                   CALL    DSEEK
C336 3E53                     LD      A,'S'             ;IN CASE OF SEEK ERROR
                    ;
C338 C397C1         DERCKV:   JP      DERRCK            ;DISK ERROR CHECK
                    ;
                    ;
C33B C305C1         ERRORV:   JP      ERROR
                    ;
                    ;
                    ; COMMAND.  SUBSTITUTE MEMORY LOCATION.
                    ;
                    ; SM <ADDR
                    ;
C33E                SUBSM:
C33E 97                       SUB     A
C33F CD85C2                   CALL    L1NCR
C342 EB                       EX      DE,HL             ;HL GETS ADDR
C343 CC30C2         SM1:      CALL    Z,PCADDR
C346 CCEFC1                   CALL    Z,SPACE
                    ; PRINT CURRENT VALUE, REQUEST NEW VALUE &
                    ; PRINT IT IF GIVEN
C349 CDC9C2                   CALL    PNM               ;PRINT (HL)
C34C CDF7C2                   CALL    PMSGFOLLOWING
C34F AE                       DB      '.'+80H           ;THE PROMPT
C350 CD19C2                   CALL    GCHR
C353 FE2F                     CP      '.'+1             ;IF <= '.',
C355 DCF1C1                   CALL    C,PCHR            ;NO SUBSTITUTION.
C358 3806                     JR      C,SM2
C35A EB                       EX      DE,HL
```

```
C35B CD8BC7      0921          CALL     GNHL            ;GET NEW VALUE
C35E EB          0922          EX       DE,HL
C35F 73          0923          LD       (HL),E
C360 FE0D        0924 SM2:     CP       CR
C362 C4E1C1      0925          CALL     NZ,SPACE
                 0926 ;
C365 C8          0927          RET      Z               ;IF CR, DONE.
C366 23          0928          INC      HL
C367 3E07        0929          LD       A,7             ;PRINT ADDRESS IF IT
C369 A5          0930          AND      L               ;IS A MULTIPLE OF 8
C36A 18D7        0931          JR       SM1
                 0932 ;
                 0933 ;
C36C             0934 RHANDLER:
C36C FE44        0935          CP       'D'+CASE
C36E 20CB        0936          JR       NZ,ERRORV
   (             0937 ;
                 0938 ; READ DISK
                 0939 ;
C370             0940 READDR:
C370 CD94C3      0941          CALL     SECSETUP
C373 C5          0942 RD2:     PUSH     BC
C374 E5          0943          PUSH     HL
C375 D5          0944          PUSH     DE
C376 CD8CC0      0945          CALL     DREAD
C379 3E52        0946          LD       A,'R'           ;IN CASE OF READ ERROR
C37B CDBCC1      0947          CALL     NEXTSC          ;NEXT SECTOR (POPS STK.)
C37E 18F3        0948          JR       RD2
                 0949 ;
                 0950 ;
C380             0951 WHANDLER:
C380 FE44        0952          CP       'D'+CASE
C382 20B7        0953          JR       NZ,ERRORV
                 0954 ;
                 0955 ; WRITE DISK
                 0956 ;
C384             0957 WRITDR:
C384 CD94C3      0958          CALL     SECSETUP
C387 C5          0959 WD2:     PUSH     BC
C388 E5          0960          PUSH     HL
C389 D5          0961          PUSH     DE
C38A CDA1C0      0962          CALL     DWRITE
C38D 3E57        0963          LD       A,'W'           ;IN CASE OF WRITE ERROR
C38F CDBCC1      0964          CALL     NEXTSC          ;(POPS STACK)
C392 18F3        0965          JR       WD2
                 0966 ;
                 0967 ;
                 0968 ; GET MEMORY ADDRESS, SECTOR # AND CHECK IT,
                 0969 ; AND LOAD B & C.
                 0970 ;
C394             0971 SECSETUP:
C394 CB69        0972          BIT      DISKMODE,C
C396 28A3        0973          JR       Z,ERRORV
C398 C5          0974          PUSH     BC
C399 CD81C7      0975          CALL     L3NCR0          ;BUFFER ADDRS & SEC #
C39C C1          0976          POP      BC
C39D CDAEC3      0977          CALL     CHKSECNO
C3A0 3899        0978          JR       C,ERRORV
                 0979 ;
                 0980 ;
                 0981 ; PRINT TRACK & SECTOR #'S
                 0982 ;
```

```
C3A2            PTRKSC:
C3A2 DB31                 IN      A,DTRACK
C3A4 57                   LD      D,A
C3A5 EB                   EX      DE,HL
C3A6 CDCCC?               CALL    PSNHL           ;PRINT TRK & SEC
C3A9 EB                   EX      DE,HL
C3AA 79                   LD      A,C             ;DISK FLAGS
C3AB 160A                 LD      D,10            ;# OF RETRIALS
C3AD C9                   RET
                ;
                ;
C3AE            CHKSECNO:
C3AE 3E1A                 LD      A,26            ;MAX SEC #, MAXI DISK
C3B0 1612                 LD      D,18            ;MAX SEC #, MINI DISK
                ;
                ;
C3B2            CHKNO:
C3B2 CB71                 BIT     MAXI,C
C3B4 2001                 JR      NZ,CN2
C3B6 7A                   LD      A,D
C3B7 B8         CN2:      CP      B
C3B8 D0                   RET     NC
C3B9 79                   LD      A,C
C3BA E603                 AND     NDRIVES-1
C3BC 47                   LD      B,A             ;DISK #
C3BD 79                   LD      A,C             ;DISK FLAGS
C3BE C9                   RET
                ;
                ;
                ; COMMAND
                ; OUT <DATA BYTE> <PORT NUMBER>
                ;
C3BF CDBEC2     OUTP:     CALL    GNHL
C3C2 EB                   EX      DE,HL           ;E GETS DATA
C3C3 CD??C2               CALL    LINCR           ;GET PORT NUMBER
                ;
C3C6 4B                   LD      C,E             ; TO C
C3C7 ED69                 OUT     (C),L
C3C9 C9                   RET
                ;
                ;
                ; BAUD RATES:
                ; 19200, 9600, 4800, 2400, 1200, 300, 150, 110.
                ;
                ;
C3CA E0C0A090   BAUDRS:   DB      0E0H,0C0H,0A0H,90H,88H,84H,82H,81H
     88848281
                ;
                ;
C3D2            CMNDTB:
C3D2 B5C1                 DW      ERROR           ;A
C3D4 ??C0                 DW      BOOTMC          ;BOOT CDOS
C3D6 B5C1                 DW      ERROR           ;C
C3D8 03C3                 DW      DSPM            ;DISPLAY MEMORY
C3DA ADC1                 DW      EXMINPUT        ;EXAMINE INPUT PORT
C3DC B5C1                 DW      ERROR           ;F
C3DE FDC2                 DW      GO              ;GO [TRANSFER OF CONTROL]
C3E0 B5C1                 DW      ERROR           ;H
C3E2 EBC0                 DW      INITBR          ;INITIALIZE BAUD RATE
C3E4 B5C1                 DW      ERROR           ;J
C3E6 04C1                 DW      KICKSTK         ;KICK SYSTEM STACK
C3E8 B5C1                 DW      ERROR           ;L
```

```
C3EA 5702          1044          DW        MOVE              ;MOVE A BLOCK OF MEMORY
C3EC B5C1          1045          DW        ERROR             ;N
C3EE BFC3          1046          DW        OUTP              ;OUTPUT
C3F0 B5C1          1047          DW        ERROR             ;P
C3F2 B5C1           1048          DW        ERROR             ;Q
C3F4 6CC3          1049          DW        RHANDLER          ;READ DISK
C3F6 20C3          1050          DW        SHANDLER          ;SUBSTITUTE MEM; SEEK TRACK
C3F8 B5C1          1051          DW        ERROR             ;T
C3FA B5C1          1052          DW        ERROR             ;U
C3FC 3AC2          1053          DW        VERIF             ;VERIFY BLOCKS OF MEMORY
C3FE 80C3          1054          DW        WHANDLER          ;WRITE DISK
                   1055 ;
                   1056 ;
      (C3FF)       1057 LASTBYTE: EQU    $-1
                   1058 ;


0000 ERRORS
```

```
                CROMEMCO CDOS Z80 ASSEMBLER V.1.4A
                           SYMBOL TABLE


ALT      007D   BAUD     0000   BAUDRS   C0CA   BOOTDK   C018
BOOTMC   C015   BOOTSW   0040   BOT200   C01C   BOT300   C024
BOT500   C03A   CASE     0000   CHKIN    C0DB   CHKNO    C3B2
CHKSEL   C3AF   CLEANS   C123   CLEANV   C189   CM6      C143
CMND     C128   CMNDTB   C3D2   CN2      C3B7   COMMND   0002
CR       000D   CRLF     C1A9   DATA     0001   DAV      0040
DCOMMN   0030   DCONTR   0034   DDATA    0033   DERCKV   C338
DERRCK   C127   DFLAGS   0034   DHOME    C03B   DISKMO   0005
DISKSE   C162   DM2      C30D   DRD250   C095   DREAD    C06B
DS2      C130   DSEC     0032   DSEEK    C054   DSK500   C072
DSK240   C071   DSPM     C303   DSPMT    C36C   DSTAT    0030
DTRACK   0031   DWR250   C06A   DWRITE   C0A1   [illegible] C071
ERROR    C1B5   ERRORV   C30B   ESC      001B   ESCAPE   C1E5
EXCCHK   [illegible] EXECUT C06A EXMINP  C1A0   FASTSK   0002
GBYTE    C0E3   GCHR     C215   GN1      C298   GN8      C28B
GNHL0    C28A   GO       C210   HDLDM    0020   HEXSH    C2A3
HX1      [illegible] HX5B4  C2B3   IMASK    0003   INITLA   C011
INTTBR   C0FF   III      C015   KICKST   C106   LINCR    C295
L2N1     C274   L2N2     C27B   L2NCR    C276   L2NCR0   C275
L3NCR    C282   L3NCR0   C281   LASTBY   C3FF   LD2N     C264
LF       000A   LOADIX   C11F   MAXT     0004   MAXIM    0010
MONITR   C10B   MOVE     C257   NDRIVE   0004   [illegible] [illegible]
NS2      C1C7   NS4      C1D1   OUTP     C3BF   [illegible] C2D8
P2HEX    C2D4   P2HXCL   C164   PADDR    C233   PARTL    0004
PC1      C1F2   PC2      C201   PC3      C217   PEADDR   C230
PCHR     C1E1   PERRMS   [illegible] PHD  C2F5   PMSG     [illegible]
PMSGFO   C217   PNHL     C20F   PNM      C2C2   PS1      [illegible]
PSNHL    C20C   PSNM     C206   PTRKSC   C3A2   RD2      C373
READDR   C370   RHANDL   C36C   SELSEL   C394   SELKNX   [illegible]
SEEKR    C322   SELS00   C0D1   SELECT   [illegible] SETUP [illegible]
SHANDL   C320   [illegible] C2FC SKSG   C2BB   [illegible] C216
SKSCCK   [illegible] SM1    C333   SM2      C360   SPACE    [illegible]
STACK    0020   START    C000   STAT     0000   SUBSM    [illegible]
TBS      0030   VERIB    C23A   VRFY     C23D   WD2      [illegible]
WHANDL   C380   WRTIDR   C384
```

CROMEMCO CROSS REFERENCE LISTING V.1.0 FOR FILE RDOS

```
ALT      0055   0565
BAUD     0037   0340
BAUDRS   1028   0339
BOOTDK   0082   0069
BOOTMC   0076   1033
BOOTSW   0039   0068
BOT200   0085   0087
BOT300   0090   0105
BOT500   0103   0076
CASE     0050   0401 0419 0670 0737 0741 0935 0952
CHKIN    0307   0316 0567
CHKNO    0999   0889
CHKSEC   0994   0540 0777
CLEANS   0378   0505
CLEANV   0504   0477 0537
CM6      0401   0397
CMND     0386   0386
CMNDTB   1031   0413
CN2      1003   1001
COMMND   0046   0342
CR       0052   0346 0370 0370 0483 0577 0766 0924
CRLF     0482   0385 0615 0639 0867
DATA     0045   0310 0576
DAV      0047   0308
DCOMMN   0029   0084 0162 0208 0235
DCONTR   0033   0120 0149 0270
DDATA    0031   0300
DERCKV   0895
DERRCK   0462   0895
DFLAGS   0032   0067 0165 0209 0236 0267
DHOME    0119   0095 0459
DISKMO   0023   0390 0433 0883 0972
DISKSE   0426   0410
DM2      0865   0873
DRD250   0209   0213
DREAD    0203   0101 0945
DS2      0455   0443 0449
DSEC     0030   0263
DSEEK    0147   0892
DSK500   0175   0154
DSK540   0179   0181
DSPM     0860   1035
DSPM1    0863   0869
DSTAT    0028   0085 0169
DTRACK   0034   0542 0984
DWR250   0236   0240
DWRITE   0231   0962
EREXIT   0168   0211 0238
ERROR    0500   0402 0404 0429 0607 0721 0898 1032 1034 1037 1039 1041
                1043 1045 1047 1048 1051 1052
ERRORV   0898   0861 0884 0890 0936 0953 0973 0978
ESC      0054   0563
ESCAPE   0503   0564 0566
EXCCHK   0164   0167 0214 0241
EXECUT   0161   0126 0128 0157 0178
EXMINP   0490   1036
FASTSE   0022   0433 0444
```

```
GBYTE    0316  0317 0344 0345 0588
GCHR     0588  0441 0447 0722 0763 0916
GN1      0722  0725
GNHL     0715  0667 0676 0701 0921 1015
GNHL0    0713  0673
GO       0849  1038
HDLDM    0041  0268
HEXSH    0734  0720 0723
HX1      0743  0740
HXSH4    0746
IMASK    0036  0066
INITBA   0339  0064
INITBR   0325  1040
IT1      0342  0348
KICKST   0355  1042
L1NCR    0701  0356 0491 0851 0885 0907 1017
L2N1     0676  0671
L2N2     0680  0674
L2NCR    0601
L2NCR0   0599  0862
L3NCR    0692  0624 0649
L3NCR0   0690  0975
LASTBY   1057
LD2N     0667  0601 0692
LF       0053  0580
LOADIX   0372  0357
MAXI     0024  0089 0104 0433 0450 1000
MAXIM    0040  0122 0155 0291
MONITR   0368  0070
MOVE     0648  1044
NDRIVE   0018  0428 1006
NEXTSC   0512  0947 0964
NS2      0522  0517
NS4      0528  0520
OUTP     1015  1046
P1HEX    0800  0798
P2HEX    0798  0476 0781 0791
P2HXCL   0475  0494
PADDR    0617
PARLEL   0038  0124 0176 0179 0183
PC1      0562  0568
PC2      0570  0572
PC3      0581  0578
PCADDR   0615  0864 0909
PCHR     0561  0468 0484 0589 0619 0810 0826 0918
PERRMS   0465  0519
PH1      0809  0807
PMSG     0823  0372 0839
PMSGFO   0837  0369 0393 0466 0501 0579 0914
PNHL     0790  0617 0634
PNM      0780  0913
PS1      0824  0828
PSNHL    0788  0638 0987
PSNM     0774  0635 0637 0865
PTRKSC   0983  0536
RD2      0942  0948
READDR   0940
RHANDL   0934  1049
SECSET   0971  0941 0958
SEEKNX   0886  0546
SEEKR    0882
SEL300   0276  0297
```

```
SELECT   0291   0119 0148 0257
SETUP    0258   0203 0231
SHANDL   0876   1050
SK1      0763   0765
SKSG     0762   0606 0669 0718
SKSG0    0760   0396 0408
SKSGCR   0606   0077 0326 0455 0702
SM1      0909   0931
SM2      0924   0919
SPACE    0555   0774 0788 0872 0910 0925
STACK    0008   0060
START    0060
STAT     0044   0307 0570
SUBSM    0905   0877
TBE      0048   0571
VERIF    0624   1053
VRFY     0630   0644 0657
WD2      0959   0965
WHANDL   0951   1054
WRITDR   0957
```

Part No. 023-0052

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